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Glassy-Winged Sharpshooter and Pierce's Disease in California

The glassy-winged sharpshooter is a devastating new pest for California. While the pest is not a problem in the Southeast United States, since its migration into California in 1990, the glassy-winged sharpshooter population there has ballooned. It can now be found throughout southern California.

This pest is a concern to California agriculture because of its ability to transmit *Xylella fastidiosa*, a bacterium that causes a variety of plant diseases including Pierce's disease, which threatens California's wine and table grape industry. The glassy-winged sharpshooter flies further than native sharpshooters, making the possibility of the bacterium's increased spread a serious agricultural threat.

Glassy-Winged Sharpshooter

The glassy-winged sharpshooter is about 0.50 of an inch (12mm) in length. Its color is dark brown to black with a black-and-yellow underside. It has yellow eyes, and the upper parts of the head and back are speckled with ivory or yellowish spots. The wings are transparent with reddish veins.

The glassy-winged sharpshooter feeds on a wide variety of plants. Scientists estimate that host plants for this sharpshooter include over 70 different plant species. Among the hosts are grapes, citrus, almond, stone fruit, and oleanders. Because of the large number of hosts, glassy-winged sharpshooter populations are able to flourish in both agricultural and urban areas.

Glassy-winged sharpshooters usually lay a mass of eggs on the underside of leaves. After the glassy-winged sharpshooter nymphs hatch, the remaining egg mass leaves a brown mark on the leaf's surface. The nymphs feed within the vascular system of the

small stems on the plant where the eggs were deposited. After several moltings or transformations, the nymphs become adult glassy-winged sharpshooters.

The sharpshooter feeds on a plant by inserting its needle-like mouth parts into the plant's xylem (the water-conducting tissues in the plant). While feeding, the glassy-winged sharpshooter excretes small droplets of a watery excrement, often called "leafhopper rain." This excrement is messy and, when dry, gives plants and fruit a whitewashed appearance.

Its feeding method, along with its voracious appetite for so many different hosts, makes the glassy-winged sharpshooter a vector for the *Xylella fastidiosa* bacterium. Once it feeds on an infected plant, the sharpshooter carries the bacterium to the next plant and transmits the disease while feeding. This spread can continue from plant to plant. A plant that is not affected by any of the diseases caused by *Xylella fastidiosa* becomes a reservoir, holding the bacterium for other sharpshooters to pick up and carry to other plants.

Pierce's Disease

The bacterium *Xylella fastidiosa* is linked to many plant diseases, including phony peach disease in the southern United States, oleander leaf scorch and Pierce's disease in California, and citrus X disease in Brazil.

Pierce's disease has long been a scourge to California's vintners. In the 1880's, the disease infected over 40,000 acres of grapes around Anaheim, devastating vineyards.

Over the years, California producers learned to cope with the disease. With the introduction of the glassy-winged sharpshooter, however, the spread of Pierce's disease has increased dramatically. In 1998, the Temecula area of Riverside County, CA, had a few localized areas of Pierce's disease. A recent report indicates now that about 30 percent of Temecula vineyards are infected with Pierce's disease.

When a vine becomes infected, the bacterium causes a gel to form in the xylem tissue of the vine,

preventing water from being drawn through the vine. Leaves on vines with Pierce's disease will turn yellow and brown and eventually drop off the vine. Shoots will also die. After 1 to 5 years, the vine itself will die.

With the spread of the glassy-winged sharpshooter, the spread of Pierce's disease has become a threat to California's entire wine and table grape industry. The proximity of vineyards to citrus orchards compounds the threat because citrus is not only a host for the sharpshooter eggs, but it is also a popular overwintering site for the insect.

Controlling the Disease

No one action can stop the spread of this disease. Instead, a multi-pronged approach must be used to control both the glassy-winged sharpshooter and Pierce's disease. The U.S. Department of Agriculture (USDA) has already allocated more than \$20 million toward control of the glassy-winged sharpshooter.

In addition to supplying funding for critical research and control, USDA's Animal and Plant Health Inspection Service (APHIS) is working with the California Department of Food and Agriculture (CDFA) to survey for this insect pest in order to find out exactly where it has become established and where it is headed.

USDA and University of California (UC) scientists are also looking at biocontrol methods to counteract the sharpshooter. Biocontrol methods rely on a pest's natural enemies to control its spread.

In August 2000, CDFA and UC scientists released hundreds of tiny parasitic wasps imported from northern Mexico in Riverside and Temecula, CA. The parasitic wasp lays its eggs inside sharpshooter eggs, killing them. The results of this test release will be studied to determine whether the natural enemies are an effective control method.

At the same time, USDA researchers are conducting DNA analysis that could be critical in determining what biocontrol agents will work best against this pest. The researchers want to find out whether the glassy-winged sharpshooter that now inhabits the southwestern United States has the same genetic make-up as the glassy-winged sharpshooter that is native to areas of similar climate in Mexico. Researchers are also looking for the pest in Central America as well as any natural enemies in

that region. The results of this research should help shed light on whether the parasitic wasp native to Mexico as well as natural enemies from other parts of the world are an appropriate method of control. If these natural enemies fail to effectively control the glassy-winged sharpshooter, APHIS' scientists will search the world for an alternative that can control the pest without negatively impacting the environment or other species.

In addition to biocontrol, USDA is conducting research on environmentally friendly chemicals, or biorationals, that could be used in combination with other control methods in the fight against the glassy-winged sharpshooter. Researchers are looking for biorationals that will kill sharpshooter eggs but not beneficial insects.

Finally, Pierce's disease must be addressed as well. Researchers recognize that to ignore Pierce's disease and only concentrate on the sharpshooter will not solve California's problem. Scientists have already initiated this research, but it is still too early to know the results of their work in this area.

It is USDA's goal to provide California with the research and tools to fight both the glassy-winged sharpshooter and Pierce's disease. In cooperation with CDFA and the University of California, USDA is working to provide relief to California's grape growers and safeguard American agriculture from plant pests and diseases.

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